

Webinars

“South America Energy Transition Week: Trends, Challenges and Best Practices”

“The relevance of pilot projects for the introduction of innovation in the mining industry”



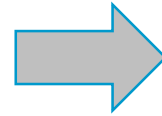
CENTRO NACIONAL
DE PILOTAJE

November de 2021





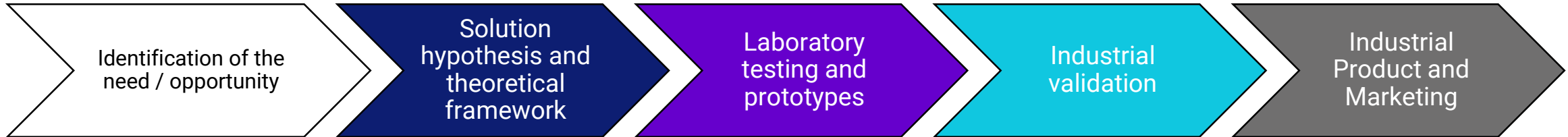
National Center For Mining Technologies Testing is a **Non-profit Corporation** that supports mining suppliers, to **accelerate the introduction of technologies** to the mining market.




“Access to pilot spaces and create more instances that bring the demand closer to the supply of innovation, are the main actions that suppliers require to innovate in mining.”

Limited capacity to industrially validate new technologies in mining

Value chain for the introduction of new technologies and developments.



Characterization of the stage	<ul style="list-style-type: none"> Answers Hypotesis 	<ul style="list-style-type: none"> Theories Assumptions Requirements Viability 	<ul style="list-style-type: none"> Modeling Validation Design iteration 	<p style="background-color: #0056b3; color: white; padding: 2px;">Industry weakness in Chile.</p>  <p>CNP</p> <ul style="list-style-type: none"> Industrial scale validation Industrial Iteration / Refining Scalability Engineering and Commissioning <u>Standards and protocols.</u> 	<ul style="list-style-type: none"> engineering Construction Set up Implementation of the final solution Industrial adoption Patent Scalability
	<ul style="list-style-type: none"> ❖ Fuentes de error en el desarrollo de una solución 	<ul style="list-style-type: none"> Modeling Validation Design iteration 	<p>Chile: Operators and providers</p> <p>Foreign: Test mines</p>		
Incumbentes involucrados	<p>Operators</p> <ul style="list-style-type: none"> Providers Developers Researchers 	<ul style="list-style-type: none"> Specialized technology centers Universities 			

Industrial validation significantly reduces risk

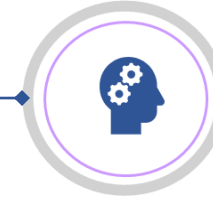


National and international referent in matters of piloting and validation of mining technologies on an industrial scale



Test Sites

Availability of a Network of Enabled Sites for Validation of technologies and pilot tests.



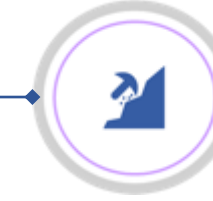
Expert Team

Team of CNP engineers and technicians complemented by experts from the Network of Partners with capacities and experience in validation and piloting.



Validated Standards

Validation protocols and standardized test designs, which guarantee the reliability of the results.



Link with the Ecosystem

Network of contacts in the ecosystem to facilitate coordination between stakeholders.



Services

Escalation of technologies, pilotage, test, validation, showroom, technological surveillance, permission.

CNP – Ecosystem Alliances

Expert network and validation infrastructure available to the CNP



Opportunities, **collaboration** and short, medium and long term agenda



Collaboration on **Ecosystem challenges**



Joint execution of **pilot and validation** projects



¿ What are we doing to introduce new technologies ?

CNP makes sites available to test new technologies, for net zero emission in mining



Energy efficiency

- Evaporation control
- Energy traceability
- Smart mining

Electromobility

- Transform diesel to electric
- Recycling Batteries and E-Waste
- New type of batteries

Use of Hydrogen

- Blending
- Fuel Cells
- Efuels
- Methanol

Tailings

- Water efficiency
- Zero waste
- New Material
- Water recovery

CNP has an active role in defining regulatory standards for the use of H2 in Mining











Guideline for the implementation of pilots and validation of technologies using hydrogen as fuel in mining

Objective

Define the necessary requirements for the implementation of pilot projects in which tests are developed, where hydrogen (H₂) is produced, conditioned, transported, distributed, stored and / or used as fuel, in mining sites and operations and that seek to validate a process that will subsequently be carried out permanently; and standardize within the Sernageomin, the evaluation criteria, applicable to all projects that meet the same characteristics.

In this way, the guide seeks to reduce the probability of incidents and accidents during the test and take care of the physicochemical stability of the facilities.

Hydrogen Roadmap to a Net Zero emission industry

Strategy	Short term[2021-2022]	Medium Term[2023-2025]	Lñong Term[2026-2030]
<p>Producers H₂</p>	 <p>Large-scale production of H2V</p>		
<p>Technology Producer H₂</p>	<p>TRL 5-6</p>  <p>TRL 6 Buses & Trucks</p> <p>TRL 5-6 Applications: CAEX (Sud Africa) Fork Lift (Chile)</p>	<p>The great Challenges</p> <ul style="list-style-type: none"> • Long equipment life (25 years) • Significant R&D investment • Batteries vs Fuel Cells Prioritizing Incentives • Technology Demand Uncertainty • Low Technology Maturity • Zero emissions TCO from high to competitive in scaling 	 <p>TRL 8-9 Disponible CAEX</p> <p>GOALS (-) 50% CO₂ (+) 50% Renewable</p> <p>TRL 8-9 Disponible Buses</p>
<p>Technology Researchers H₂</p>	<p>TRL 3 Proof of Concept Use of Hydrogen for Steel Casting</p>  <p>TRL 3 Proof of Concept Use of Hydrogen for Copper Smelting</p> 	<p>TRL 5-6 Available Fuel Cells</p> 	
<p>Consumers H₂</p>			
<p>Regulators H₂</p>	 <p>Test guide for pilots Published in October 2021</p>		

Project H2v

“Integration of hydrogen systems in a mining environment for energy backup”

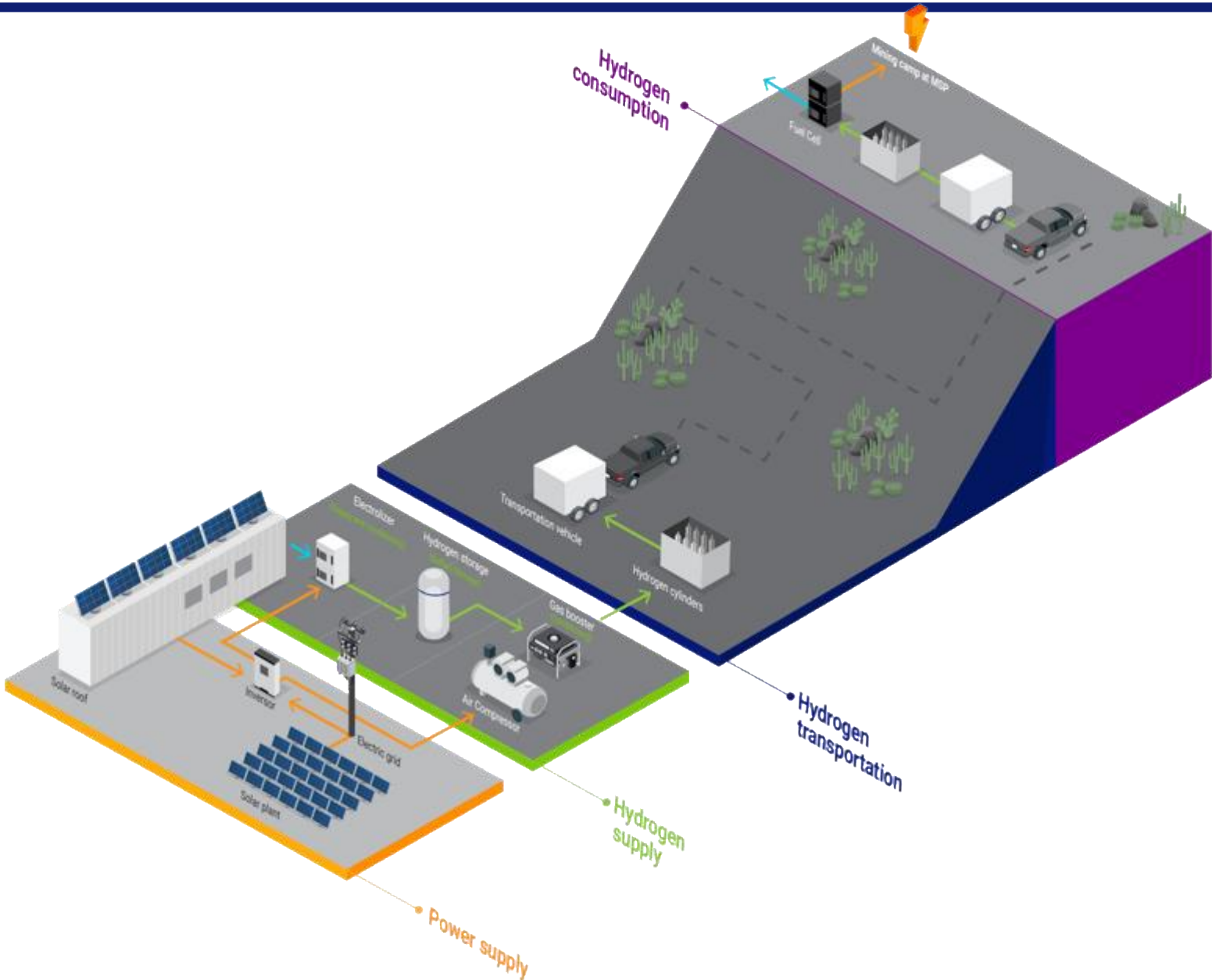
Objective

Create the availability to pilot and validate technologies that generate, store, conditioning, distribute, consume and monitor hydrogen for use as fuel. In addition, generate experience in the installation, operation, maintenance and safety of equipment that uses hydrogen through the application of hydrogen in the mining operation at Minera San Pedro (MSP).



CNP construction project for testing H2 use in mining

- Electricity
- Hydrogen
- Water



Come to test and validate the CNP

The CNP collaborates and generates an innovation ecosystem for the rapid and safe transformation of the mining industry.

Collaboration Benefits

Don't duplicate efforts and infrastructure



Accelerate the introduction of technology



Adapt solutions to industry



CNP – MSP strengths/competitive advantages

CNP technical experts knowledge and availability of high standard test sites

Recognized as an independent third party in validation

Network of experts with experience in finding solutions and scaling